Listing of Claims

1. (currently amended): An optical waveguide comprising:

a bottom boundary material;

a precursor waveguide material deposited on the bottom boundary material, the precursor waveguide material formed from a two-component plasma reaction in a substantially air-evacuated plasma chamber, a first component of the two-component plasma reaction comprising a non-carbon containing and non-oxygenated silicon donor, and a second component of the two-component plasma reaction comprising a non-silicon containing and non-oxygenated organic precursor, the precursor waveguide material ~~comprising:~~ comprising (Si-H) and (Si-Si) low molecular weight fragments interstitially situated within a substantially non-photosensitive organic polymer matrix, the precursor waveguide material forming on the bottom boundary material:

a waveguide core; and

a one or more side ~~boundary material~~ boundaries formed by selectively photo-oxidizing a region of the precursor waveguide material adjacent to the waveguide core by exposing the region of the precursor waveguide material to a radiated electromagnetic energy in the presence of oxygen, whereby primarily the silicon in the (Si-H) and (Si-Si) fragments oxidize to form the one or more side boundaries of the waveguide core; and

a top boundary material formed over the precursor waveguide material.

2. (original): The optical waveguide of claim **1** wherein the second component of the two-component plasma reaction is selected from the group consisting of alkanes, alkenes, alkynes, phenyls and aromatic hydrocarbons.

3. (original): The optical waveguide of claim **1** wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.

4. (original): The optical waveguide of claim **1** wherein the first component of the two-component plasma reaction is selected from the group consisting of monosilane, disilane and dichlorsilane.

5. (original): The optical waveguide of claim **4** wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.

6. (canceled)

7. (canceled)

8. (canceled)

9. (canceled)

10. (canceled)

11. (canceled)

12. (canceled)

13. (currently amended): A vertically stacked, multiple waveguide core, plasma deposited waveguide structure comprising:

an at least two waveguide core layers, each of the at least two waveguide core layers formed from a two-component plasma reaction in a substantially air-evacuated plasma chamber, a first component of the two-component plasma reaction comprising a non-carbon containing and non-oxygenated silicon donor, and a second component of the two-component plasma reaction comprising a non-silicon containing and non-oxygenated organic precursor, each of the at least two waveguide core layers comprising (Si-H) and (Si-Si) low molecular weight fragments interstitially situated within a substantially non-photosensitive organic polymer matrix, wherein an at least one region of an each one of the at least two waveguide core layers is selectively photo-oxidized by exposing the at least one region to a radiated electromagnetic energy in the presence of oxygen whereby primarily the silicon in the (Si-H) and (Si-Si) fragments oxidize in the at least one region of each one of the at least two waveguide core layers, the at least two waveguide core layers arranged in a stack having a first layer and a last layer;

a barrier layer disposed between the each one of the at least two waveguide core layers, the barrier layer comprising a material for blocking transmission of the radiated electromagnetic energy;

a bottom boundary material disposed over the first layer of the at least two waveguide core layers, the bottom boundary layer forming a first end layer of the plasma deposited waveguide structure; and

a top boundary material disposed over the last layer of the at least two waveguide core layers, the top boundary material forming a second end layer of the plasma deposited waveguide structure, whereby a light signal is selectively guided through each of the at least two waveguide core layers.

14. (canceled)

15. (canceled)

16. (previously presented): The waveguide structure of claim 13 wherein the second component of the two-component plasma reaction is selected from the group consisting of alkanes, alkenes, alkynes, phenyls and aromatic hydrocarbons.

17. (previously presented): The waveguide structure of claim 13 wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.

18. (previously presented): The waveguide structure of claim 13 wherein the first component of the two-component plasma reaction is selected from the group consisting of monosilane, disilane and dichlorsilane.

19. (previously presented): The waveguide structure of claim 18 wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.

20. (currently amended): An optical waveguide comprising:

a bottom boundary material;

a precursor waveguide material deposited on the bottom boundary material, the precursor waveguide material formed from a two-component plasma reaction in a substantially air-evacuated plasma chamber, a first component of the two-component plasma reaction comprising a non-carbon containing and non-oxygenated silicon donor, and a second component of the two-component plasma reaction comprising a non-silicon containing and non-oxygenated organic precursor, the precursor waveguide material ~~comprising:~~ comprising (Si-H) and (Si-Si) low molecular weight fragments interstitially situated within a substantially non-photosensitive organic polymer matrix, the precursor waveguide material forming on the bottom boundary material:

a side boundary material; and

a waveguide core formed by selectively photo-oxidizing a region of the precursor waveguide material in the side boundary material by exposing the region to a radiated electromagnetic energy in the presence of oxygen whereby primarily the silicon in the (Si-H) and (Si-Si) fragments oxidize to form the waveguide core; and

a top boundary material formed over the precursor waveguide material.

21. (previously presented): The optical waveguide of claim 20 wherein the second component of the two-component plasma reaction is selected from the group consisting of alkanes, alkenes, alkynes, phenyls and aromatic hydrocarbons.

22. (previously presented): The optical waveguide of claim 20 wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.

23. (previously presented): The optical waveguide of claim 20 wherein the first component of the two-component plasma reaction is selected from the group consisting of monosilane, disilane and dichlorsilane.

24. (previously presented): The optical waveguide of claim 23 wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.

25. (presently amended): An optical waveguide comprising:

a bottom boundary material;

an at least two layers of precursor waveguide material deposited on the bottom boundary material, each of the at least two layers of precursor waveguide material formed from a two-component plasma reaction in a substantially air-evacuated plasma chamber, a first component of the two-component plasma reaction comprising a non-carbon containing and non-oxygenated silicon donor, and a second component of the two-component plasma reaction comprising a non-silicon containing and non-oxygenated organic precursor, each of the at least two layers of precursor waveguide material comprising (Si-H) and (Si-Si) low molecular weight fragments interstitially situated within a substantially non-photosensitive organic polymer matrix, each of the at least two layers of the precursor waveguide material comprising:

a waveguide core formed in at least one of the at least two layers of the precursor waveguide material by selectively photo-oxidizing a first region of the precursor

waveguide material by exposing the first region of the precursor waveguide material to a radiated electromagnetic energy in the presence of oxygen whereby primarily the silicon in the (Si-H) and (Si-Si) fragments oxidize in the first region; and

a one or more side ~~boundary material~~ boundaries formed by selectively photo-oxidizing a second region of the precursor waveguide material adjacent to the waveguide core by exposing the second region of the precursor waveguide material to a radiated electromagnetic energy in the presence of oxygen, whereby primarily the silicon in the (Si-H) and (Si-Si) fragments oxidize in the second region to form the one or more side boundaries of the waveguide core; and

a top boundary material formed over the at least two layers of precursor waveguide material.

26. (previously presented): The optical waveguide of claim 25 wherein the second component of the two-component plasma reaction is selected from the group consisting of alkanes, alkenes, alkynes, phenyls and aromatic hydrocarbons.

27. (previously presented): The optical waveguide of claim 25 wherein the first component of the two-component plasma reaction is selected from the group consisting of monosilane, disilane and dichlorsilane.

28. (previously presented): The optical waveguide of claim 27 wherein the second component of the two-component plasma reaction is selected from the group consisting of ethylene, methane, ethane and toluene.